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ABSTRACT

Four deficiencies that exist in the research literature that must be remedied before more conclusive answers about the effects of innovations in the teaching of psychology are examined. These deficiencies are: (1) failure to accurately describe teacher and learner behaviors involved in experimental and control treatments; (2) failure to investigate individual differences within the experimental samples employed; (3) failure to determine, select and employ appropriate measures of educational outcomes; and (4) failure to include cost-benefit consideration in evaluating outcomes. (Author/DB)

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EFFECTIVENESS OF INNOVATIONS IN THE TEACHING OF PSYCHOLOGY: A CRITIQUE

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Increasingly, psychologists are developing innovative programs which strive to improve the quality of instruction in the psychological realm. As the search for more effective procedures evolves however, important theoretical and methodological considerations are often discarded or avoided.

One issue that must be confronted is how differences in student characteristics are met. Variations in educational methods will probably account for only a small percentage of the variance when not accompanied by instructional strategies that permit individualization. Research demonstrating the effect of many individual difference variables on college instruction is well documented. Attempts to treat experimental classes as homogeneous groups, ignoring possible aptitude-treatment interactions, should be viewed with suspicion.

The need to accurately describe teacher and learner behaviors involved in experimental and control treatments is also of concern when assessing innovations. Frequently, "lectures" or "traditional approaches" are used as controls with little attempt to operationally define their composition. Are several classes all employing lecture formats all part of a single treatment? Perhaps classroom observation systems could be used to establish similarity in treatment conditions.

The issue of what the terminal behavior of students instructed in psychology should be is not likely to be settled soon. However, it is important to be able to differentiate between innovations that stress opposing views of what the criteria used to define success should be. Comparing the results of a behavioral approach to college teaching with a learner-controlled instruction model, for example, requires a broad view of expected outcomes.

Additionally, some notion of cost-benefit measures should be employed to assess innovative techniques. Questions such as amount of time involved, manpower employed, facilities available, etc. should be considered prior to the acceptance and deploymentof a new technique.

Effectiveness of Innovations in the Teaching of Psychology: A Critique

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Increasingly, psychologists are developing innovative approaches which are designed to improve the quality of instruction in the psychological realm. To date, however, few innovations have received universal acclaim as "the" way to teach psychology; in fact, there are probably as many innovative approaches as there are researchers in the field. As Dubin and Taveggia have demonstrated in an exhaustive review of 96 investigations of college teaching methods (1968) obvious technological differences in methodology (such as lecture vs independent study) make no difference in student performance when the studies are examined in total. The evidence to date gives no encouragement to those who would hope that we have identified a single reliable, multipurpose teaching strategy that we can use with confidence that it is the "best" approach.

Perhaps part of the reason for this is that research has often failed in the past to integrate models of teaching with appropriate learning outcomes and behaviors of students. As Ericksen has suggested in a 1968 Division Two address, "measures of good teaching are found in what a student learns, not in the teaching model where teaching becomes its own end." The recent development of the field of instructional psychology is one attempt to unite the "science of teaching" with the "art of learning" as Ericksen has referred to them.

This paper however, will address itself more to theoretical and methodological considerations which have often been forgotten or avoided in research on the teaching of psychology, rather than continue the teaching model--learning model debate. Specifically, this critique will examine four deficiencies existing

in the research literature which must be remediated before more conclusive answers about the effects of teaching innovations can be developed:

(a) failure to accurately describe teacher and learner behaviors involved in experimental and control treatments

(b) failure to investigate individual differences within the experimental samples employed

(c) failure to determine, select and employ appropriate measures of educational outcomes

(d) failure to include cost-benefit considerations in evaluating outcomes.

Description of Experimental and Control Treatments

Inadequate description of the experimental techniques under study as well as control conditions, is perhaps the greatest deficiency in the recent literature on teaching innovation. A large majority of the 31 studies reviewed for this paper which compared more than one strategy of teaching provided incomplete information about both treatments employed. The most typical procedure is to characterize a particular treatment with a label such as "lecture," "traditional," "self-paced" or "small group" with little or no data or operational terms used to clarify what particular interaction was occurring within these groups. For example a lecture class can be conducted so that discussion is invited, analysis by the learners is provoked and the format generally avoids the stereotyped "rote" presentation of information (Ausubel, 1969). My own use of self-paced instruction has indicated that many students perceive self-pacing as a means whereby they can attend to other course work for 90% of the semester and cram at the end for mine. Moreover, we have all participated in small group discussions (committees) which have psychologically served

as "group monologues."

This is not to say that these are bogus techniques, but rather that we need operational descriptions of these labels in order to make judgments of their effectiveness. One fruitful approach would be to utilize direct/indirect teaching ratios or other categories of observational systems such as Flanders (1963) Rosenshine (1970) has suggested using classroom observation systems to establish similarity in treatment conditions in classroom research, as well as to confirm treatment outcomes. He does recommend, however, that care be exercised in choosing between instruments that identify high vs. low inference variables ("clarity of" as opposed to "giving" directions). Such a procedure would not only differentiate among treatments but could be used to establish similarity among sub-groups within one treatment; for example, 3 classes under a lecture approach with 3 different instructors.

Other procedures which might provide additional descriptive data by which treatments could be clarified are observed or subject-reported study time, number of meetings between student and instructor in independent study approaches, distribution of work time in self-paced techniques, or unobtrusive measures directly relevant to the experimental tasks. It might also be useful to know something of the difficulty level or complexity of the material to be learned, especially in studies of programmed learning.

With these procedures in mind, let us look at several models of instructional innovations and their effects. One such model, the behavioral approach, is based on operant conditioning procedures and are usually characterized by increased personal contact for students with other more knowledgeable peers (managers), clearly defined goals in terms of observable student behavior, immediate and frequent feedback on student performance, mastery of behavioral criteria and verbal behavior of learners. The studies often follow a one sample

no control design with teacher and learner behaviors well-defined and data kept on each subject for each training session (Johnson and Pennypacker, 1971). There appeared to have been possible variability in the behavior of student managers in this study however, and reliability data on their performance is not available. Behavioral approaches have been found to produce better short- and long-term retention of factual knowledge than lecture procedures (Cooper and Greiner, 1971; Stalling, 1971, Morriss and Kimbrell, 1972) and all three studies have reported higher student ratings for the experimental approach. Cooper and Greiner report experimental Ss spending significantly greater time in preparation for the course. All three of these studies failed to describe the "traditional" control class.

Another model of innovation can be referred to as "participative" after Maier (1972). This approach stresses group interaction in which students discuss material, solve problems, role-play and participate in simulated game activities. Studies by Diamond (1972) and Pollack (1972) both suggest superior performance for active small groups although description of experimental and control treatments is inadequate and supporting data is often not available. Student ratings of this approach are high, but we have no way of knowing what this means without adequate description of treatments.

Self-paced programmed instruction techniques continue to appear in the literature. These studies also describe superior performance on final exams when compared to traditional lecture controls (Menges and Marx, 1971; Sapp, Edward and Thomas, 1972; Himmel, 1972). However, student evaluation is mixed--Sapp, Edwards and Thomas reporting negative ratings because of resentment of amount of work required. We again have no adequate description of control classes and the experimental treatments often appear to be specially prepared

packages including specially chosen instructor and student aids, new materials and media, and immediate feedback which are often apparently withheld from the control condition.

A recent innovation best described as learner-controlled instruction involves students getting their own objectives for a specific semester and using the instructor as a resource person (Treffinger and Davis, 1972) in the educational psychology field or conducting personal experimentation in a psychology laboratory course (Regula, 1971). Other related work is that of Grinder (1970) who allows students to choose among a wide variety of educational psychology topics taught in modular format. The goal of meeting student's personal needs of relevance is admirable especially in light of the criticisms these authors report which exist among students toward the perceived usefulness of traditional content. Definitive data supporting the substitution of these approaches for traditional ones has not yet been obtained, partially because of the difficulty of comparing self-designed student outcomes with teacher-imposed objectives.

In summary, it appears that what is needed for research to improve in this area, is a well-conceived dimension(s) of instructional methodology with clearly established lines of demarcation between levels of the dimension-perhaps ranging from learner-controlled instruction to experimenter-controlled. The Gross distinctions made to this point between instructional innovations have not been operationalized well enough to provide clear understanding of what is occurring in the college teaching-learning environment.

Individual Differences

The major contention here is that the failure to find one best instructional methodology is a lost cause; effective instructional innovations must be sensitive to differences existing within individual learners and must be

capable of adapting to these differences when they appear. As Atkinson (1972) has pointed out in referring to research in the area of reading, "the manipulation of method variables accounts for only a small percentage of the variance when not accompanied by instructional strategies that permit individualization." Individualization in college teaching may be illusory however; there may potentially be as little individualization in assigning all students in a freshman undergraduate psychology class to an independent study format as there is to placing them in the much-maligned lecture course.

Recent research has suggested that the sources of individual differences which interact with learning in college may be other than those traditionally employed, i.e. IQ, grade point average, amount of previous contact with subject matter field etc. Glaser and Resnick (1972) in discussing aptitude-treatment interactions in instruction suggest that traditionally accepted aptitude constructs are not appropriate to research on instructional methodology, "because these measures come from psychometrically-selection-oriented traditions which do not relate to the processes of learning and performance. They suggest conceptualizing individual differences in terms of process constructs such as mediational processing, stimulus coding, cognitive styles, etc.

The recent literature of the teaching of psychology does suggest several clusters of process variables which have been found to interact with instructional outcomes. Although perhaps not independent, these might be classified for purposes of convenience as response styles, personalized needs, and internal-external orientation.

Grasha (1972) has described response style-dimensions of participatory-avoidance, co-laborative-competitive and independent-dependent, which he

feels characterize students' behavior under traditional formats. He has suggested activities which were designed to facilitate participation, collaboration and independence in undergraduate psychology courses, and although the criterion measure was based on self-report questionnaires, there was found to be a beneficial effect on each of these dimensions as a function of the type of classroom experience. The conceptual systems theory of Harvey, Hunt and Schroder (1967) has a more cognitively-oriented response style--that of conceptual level (CL). Conceptual level is inversely related to the amount of structure needed--low CL learners would be expected to profit more from educational approaches providing a high degree of structure, while high CL learners benefit from teaching procedures providing low structure (Schroder, Driver and Streufert, 1967). This model emphasizes "matching" the conceptual level of the learner with the appropriate degree of structure in the teaching approach.

Personalized needs of learners have been found to affect student's ratings of and performance in psychology courses. Menges and Trumpeter (1972) have demonstrated that relevance is regarded as an important dimension of student's perception of psychology courses; relevance being defined by student's as whether a course meets personal needs of social utility and self-understanding. This suggests that innovations engineered to demonstrate the immediate utility of a subject matter should be rated highly, and that student performance may be positively affected by the perceived relevance of a course. Bigelow and Egbert (1971) in an investigation of independent study vs. traditional procedures found that intellectual efficiency and responsibility were personality traits pertinent to independent study success. Within the group of successful

independent study students, those with greater social needs tended to be less satisfied with independent study. A study of small-group interaction in a social psychology course (Beach, 1970) revealed that learning was enhanced when group members were 'other-oriented' thus providing further support for the interaction between social needs of students and the "independent study--intact class group" dimension. Pascal (1970) also noted that students choosing an independent study approach to a social psychology course had a greater need for autonomy, higher tolerance for ambiguity, and a greater preference for abstract and scientific thinking than Ss preferring a lecture approach. Independent study Ss who were able to choose type of class format rated the course less difficult and less anxiety-provoking than those who were not given the choice of options but were placed in an independent study group. No evidence is provided as to whether ratings correlated with actual performance.

In an interesting study of internal-external orientation, Eilersen (1972) found an interaction between locus of control and structure of course. Eilerser reported that Ss high on Internality (Rotter's Internal-External Locus of Control Scale) achieved significantly better and participate more extensively in the unstructured course format although locus of control had little effect on performance in the structured class.

There does seem to be ample evidence that a variety of student characteristics interact with instructional innovations to produce differential learning. It would appear necessary in future research on teaching innovations to know more about how students differ on the above mentioned dimensions, as well as how new techniques might take these into account. One potentially fruitful aid in this regard is the development of large-scale standardized indices of the college environment such as the College and University Environ-

ment Scales (Pace, 1963) or the Environmental Assessment Technique (Austin and Holland, 1961). These instruments can provide profiles of colleges at which research is taking place on dimensions such as social responsibility, vocational orientation, etc. In this way student differences and their effect on instructional innovation can be better understood.

Criterion Measures

The question of which objectives to be concerned about during instruction in psychology is not likely to be resolved soon. In 1952, Wolfle, Buston et al. identified three types of objectives which they felt psychology courses ought to strive for--knowledge, habits of thought (scientific analysis, observation etc.) and values or attitudes. Innovations in instructional technique still address themselves to these groups of objectives with perhaps greater sophistication. However, studies very often vary in how they operationally define and measure given objectives or which ones receive priority. We often read of vague goals such as "experience personal relevance," "acquire personal understanding," or "develop social skills." Attainment of these goals is assessed through self-report questionnaires of questionable reliability. Other criteria are often developed only for purposes of the study in question, then are discarded with no attempt at standardization. Finally, the criteria used are so broad as to be meaningless. What objectives specifically are measured by performance on a final exam for example, other than perhaps test-taking ability? Yet final exam performance is often the sole criterion of comparative studies.

It is suggested here that evaluative studies of innovative techniques attempt to measure some common set of objectives which could be used as a basis for comparison; something akin to "trials to criterion" or "number of bar presses" employed in the experimental literature. Despite the dangers of

reductionism in and the tendency to measure only easily observable behaviors which could potentially arise from such an approach, the gain in our ability to compare and evaluate instructional models would be considerable. Examples of sets of objectives which might assess knowledge and skills as well as attitudinal ones is of course Bloom's taxonomy of the cognitive domain (1956) and Krathwohl, Bloom and Masia's taxonomy of the affective domain (1964). These attempt to organize educational objectives into a unified framework by establishing levels of complexity within each domain, thus accommodating a wide variety of goals commonly established for psychology courses. A brief review of several studies which have been attempted employing these taxonomies may be appropriate here.

Studies employing a behavioral approach to college teaching often utilize either a self-paced contingency method adopted by Keller (1968) in which students are required to master programmed material before advancing on an interview procedure in which "managers" assess student's verbal behavior on an accuracy or fluency measure (Ferster, 1968; Johnston and Pennypacker, 1971). Such measures are most often used to assess recall of factual knowledge and comprehension, but there have been some attempts at assessing higher-level outcomes as well. Morriss and Kimbrell (1972) found that performance on essay tasks requiring Ss to predict the outcome of an experiment based on a given psychological principle was facilitated by the Keller method, thus demonstrating the technique's effectiveness in fostering application skills. Johnston and Pennypacker (1971) attempted to assess characteristics of verbal behavior such as "synthesis, assimilation, creativity, and originality" which may be considered comparable to higher levels of

Bloom's taxonomy. However, verbal responses were subjectively noted by student managers on a 3-point scale for these characteristics with no evidence as to rater reliability. Assessment of learner's verbal phrases denoting synthesis, creativity, etc. in the subject matter area may have been more consistent here.

Feldhusen (1973) has developed a three-stage model of instruction in which eight educational goals defined in terms of Bloom's taxonomy serve as a basic guide. His approach employs individualized instruction, small group discussion and individual projects at appropriate stages of the course. Knowledge and comprehension skills are acquired at the first stage through individualized instruction; application, analysis and evaluation abilities are developed through small group discussion and affectiva goals are attained through field-related individual projects. Although data is not yet available to allow analysis of the results of this model, it appears highly promising.

In a study already described, Pascal (1970) found Ss under independent study formats out-performed Ss in lecture, and lecture-discussion groups on a task requiring evaluation of a research article. There were no differences between the groups in application of course materials to new situations. Miller (1972) studying the use of observational methods in an adolescent psychology course, found that observation had no effect on the ability to analyze and interpret case study material.

What seems to be evolving here are more refined attempts at specifying a variety of educational objectives and assessing instructional innovations in terms of how well they facilitate each of these potential outcomes. There is room for hope that we are going beyond the point where we compare

"our method" with somebody else's method on final exam performance and make generalizations from that limited data base.

Cost-Benefit Analysis

In any consideration of methods and means, there are factors of cost and time as well as resulting benefits that are associated with each method. In comparative studies of teaching innovations if the costs for instruction were equal for all strategies employed, then attention to comparative benefits only would be appropriate. If both costs and benefits are significantly different then it is essential that both be assessed and reported. Indeed, as Dubin and Taveggia (1968) have suggested, since little difference can be found in the benefits of various pedagogical methods, costs per instructional unit should be a major consideration in decision-making relative to instructional approach.

Kaufman (1972) in discussing systems analysis techniques and their relevance to education has suggested various approaches to cost-benefit analysis, including PPBS (Planning Programming Budgeting Systems) which are widely used in industry. These involve essentially the identification of possible instructional alternatives, specifying their cost-benefits and ranking these alternatives. Educational decisions could be made on the basis of these rankings. It is suggested that researchers provide data so that assessment of an innovation can be based on cost-benefit criteria as well as more traditional ones.

Unfortunately, researchers rarely present such information--only two studies were found in the present review which did so. Sulzer (1968) reported that the use of a computerized student response system to teach educational psychology would cost from $20 to 40,000/80 station unit, but costs would

decrease markedly after initial expenses. This of course is an important concern in evaluating costs; most media innovations such as CAI, ETV, etc. have high short-term costs, but costs decline over the long-term. It would be far more appropriate to use longer units of time to assess these types of innovations than the typical semester unit, for example. Johnston and Penneypacker (1972) also reported cost-benefit data but only for the behavioral approach being studied; there was no control. Their data took form of a manager (tutor) - student ratio of 7:1 (six student assistants/43 students) which varied on replications from 3 - 12:1. Since the managers were all undergraduates working not for pay, but seminar credit, the authors felt the cost was minimal. Although it is not clear what six student assistants each working with 7 students might accomplish under other formats, this kind of data at least provides some notion of cost that can be evaluated.

Most studies however, hide data relevant to cost. We have already noted the tendency to use that "extra" more experienced TA, or the new, modern equipment or facilities on the experimental innovation, rather than the control condition. Until researchers report cost-benefit data for all conditions under investigation, it will be difficult to properly evaluate instructional methods. Of course, a far more fundamental question, going beyond dollars and cents or time-personnel factors should be asked relevant to cost-benefit. This refers to an issue already raised in this paper and will be again in this symposium, I am sure; that is what educational objectives (outcomes) are being attained by virtue of the innovation under study (benefits) and which are being neglected, sacrificed or distorted (costs).

In summary, although much research has been conducted in establishing new instructional techniques we have yet to answer crucial questions relative to

teaching and learning in college courses. Perhaps future research meeting the criticisms raised here will provide more definitive answers. One new direction that future research might take is to examine commonalities among teacher and student behaviors within different innovational formats, rather than emphasize differences as we have in the past with little success.

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